AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. The following listing provides the amended claims with deleted material crossed out and new material underlined to show the changes made.

1.   (Previously Presented) A method of quantizing a particular macroblock of a particular frame in a sequence of digital video frames, the particular frame having a frame type, said method comprising:

determining a buffer occupancy accumulator for the particular frame as a difference between an actual amount of bits used to encode a previous frame having the same frame type as the particular frame and a requested amount of bits for the previous frame having the same frame type as the particular frame;

limiting an amount of change in said buffer occupancy accumulator based upon the frame type; and

encoding said macroblock using a quantizer value computed based on said buffer occupancy accumulator

wherein the determining, limiting, and encoding are performed by an encoder.

2.   (Canceled)

3.   (Currently Amended) The method of claim 1, wherein said limiting an amount of change in said buffer occupancy accumulator is performed by clipping said buffer occupancy accumulator with respect to the target number of bits of the particular frame.

4.   (Currently Amended) The method of claim 1, wherein said limiting an amount of change in said buffer occupancy accumulator is performed by scaling said buffer occupancy accumulator with respect to the target number of bits of the particular frame.

5. (Currently Amended) A method of quantizing a particular macroblock of a particular frame in a sequence of digital video frames, said method comprising:

determining a base quantizer;

determining a quantizer adjustment based on a ~~scaling function that is different for different macroblock coding methods~~ difference between a number of bits actually used to encode previous macroblocks of the frame and a number of bits that should have been used to encode previous macroblocks of the frame; and

encoding said macroblock based on a quantizer value computed as a sum of the base quantizer value and the quantizer adjustment,

wherein the determining a base quantizer value, determining a quantizer adjustment, and encoding are performed by an encoder.

6. (Canceled)

7. (Currently Amended) The method of claim ~~5~~9, wherein the scaling function is a function of a position of the particular macroblock within the particular frame.

8. (Currently Amended) The method of claim ~~5~~9, wherein the scaling function is a function of bits per pixel of the particular frame.

9. (Currently Amended) The method of claim 5, wherein said quantizer adjustment is further based on a scaling function that is different for different macroblock coding methods ~~difference between a number of bits actually used to encode previous macroblocks of the frame and a number of bits that should have been used to encode previous macroblocks of the frame~~.

10. (Currently Amended) The method of claim ~~9~~5, wherein said number of bits that should have been used is calculated in a manner that takes into account macroblock coding methods.

11. (Previously Presented) The method of claim 5, wherein said quantizer adjustment is further based on a Normalized Sum of Absolute Differences (NSAD).

12. (Previously Presented) The method of claim 5, wherein said quantizer adjustment is further based on a macroblock activity measure normalization (mbactN).

13. (Previously Presented) The method of claim 5, wherein determining a base quantizer value comprises clipping said base quantizer value to produce an adaptively determined finite range.

14. (Previously Presented) A method of determining a quantizer value for quantizing a particular macroblock of a particular frame in a sequence of digital video frames, said method comprising:

when the particular frame is a first frame type, computing a number of bits that should have been used to encode all previously encoded macroblocks of the particular frame by using a first formula;

when the particular frame is a second frame type, computing the number of bits that should have been used to encode all previously encoded macroblocks of the particular frame by using a second formula;

determining a delta value comprising a difference between a number of bits actually used to encode all previous macroblocks of the frame and the computed number of bits that should have been used; and

quantizing said particular macroblock using a quantizer value computed as a sum of a base quantizer value and a quantizer adjustment, said quantizer adjustment computed based on said delta value,

wherein the computing, determining, and quantizing are performed by an encoder.

15. (Canceled)

16. (Currently Amended) A computer readable medium storing a computer program which when executed by ~~at least one~~ a processor quantizes a particular macroblock of a particular

frame in a sequence of digital video frames, the particular frame having a frame type, the computer program comprising sets of instructions for:

determining a buffer occupancy accumulator for the particular frame as a difference between an actual amount of bits used to encode a previous frame having the same frame type as the particular frame and a requested amount of bits for the previous frame having the same frame type as the particular frame;

limiting an amount of change in said buffer occupancy accumulator based upon the frame type; and

encoding said macroblock using a quantizer value computed based on said buffer occupancy accumulator.

17.   (Canceled)

18.   (Previously Presented) The computer readable medium of claim 16, wherein said limiting an amount of change in said buffer occupancy accumulator is performed by clipping said buffer occupancy accumulator.

19.   (Previously Presented) The computer readable medium of claim 16, wherein said limiting an amount of change in said buffer occupancy accumulator is performed by scaling said buffer occupancy accumulator.

20.   (Currently Amended) A computer readable medium storing a computer program which when executed by ~~at least one~~ a processor quantizes a particular macroblock of a particular frame in a sequence of digital video frames, the computer program comprising sets of instructions for:

determining a base quantizer value;

determining a quantizer adjustment based on a ~~scaling function that is different for different macroblock coding methods~~ difference between a number of bits actually used to encode previous

macroblocks of the frame and a number of bits that should have been used to encode previous macroblocks of the frame; and

encoding said macroblock based on a quantizer value computed as a sum of the base quantizer value and the quantizer adjustment.

21.   (Canceled)

22.   (Currently Amended) The computer readable medium of claim ~~20~~24, wherein the scaling function is a function of a position of the particular macroblock within the particular frame.

23.   (Currently Amended) The computer readable medium of claim ~~20~~24, wherein the scaling function is a function of bits per pixel of the particular frame.

24.   (Currently Amended) The computer readable medium of claim 20, wherein said quantizer adjustment is further based on a <u>scaling function that is different for different macroblock coding methods</u> ~~difference between a number of bits actually used to encode previous macroblocks of the frame and a number of bits that should have been used to encode previous macroblocks of the frame~~.

25.   (Currently Amended) The computer readable medium of claim ~~24~~20, wherein said number of bits that should have been used is calculated in a manner that takes into account macroblock coding methods.

26.   (Previously Presented) The computer readable medium of claim 20, wherein said quantizer adjustment is further based on a Normalized Sum of Absolute Differences (NSAD).

27.   (Previously Presented) The computer readable medium of claim 20, wherein said quantizer adjustment is further based on a macroblock activity measure normalization (mbactN).

28.   (Previously Presented) The computer readable medium of claim 20, wherein the set of instructions for determining a base quantizer value comprises a set of instructions for clipping said base quantizer value to produce an adaptively determined finite range.

29. (Currently Amended) A computer readable medium storing a computer program which when executed by ~~at least one~~ a processor determines a quantizer value for quantizing a particular macroblock of a particular frame in a sequence of digital video frames, the computer program comprising sets of instructions for:

when the particular frame is a first frame type, computing a number of bits that should have been used to encode all previously encoded macroblocks of the particular frame by using a first formula;

when the particular frame is a second frame type, computing the number of bits that should have been used to encode all previously encoded macroblocks of the particular frame by using a second formula;

determining a delta value comprising a difference between a number of bits actually used to encode all previous macroblocks of the frame and the computed number of bits that should have been used; and

quantizing said particular macroblock using a quantizer value computed as a sum of a base quantizer value and a quantizer adjustment, said quantizer adjustment computed based on said delta value.

30. (Canceled)

31. (Previously Presented) The computer readable medium of claim 29, wherein the frame type is one of an intra-frame encoded and an inter-frame encoded.

32. (Previously Presented) The method of claim 1, wherein the frame type is one of an intra-frame encoded and an inter-frame encoded.

33. (Canceled)

34. (Previously Presented) The method of claim 14, wherein the frame type is one of an intra-frame encoded and an inter-frame encoded.

35. (Previously Presented) The computer readable medium of claim 16, wherein the frame type is one of an intra-frame encoded and an inter-frame encoded.

36. (Canceled)

37. (Previously Presented) The method of claim 1, wherein limiting the amount of change in the buffer occupancy accumulator comprises limiting the change to a particular percentage of a value of the buffer occupancy accumulator from the previous frame having the same type as the particular frame.

38. (Currently Amended) The method of claim ~~5~~9, wherein the macroblock coding method is one of intra-macroblock and non-intra-macroblock.

39. (Currently Amended) The method of claim ~~9~~5, wherein the quantizer adjustment is based upon multiplying the scaling function by (i) the difference between the number of bits actually used to encode previous macroblocks of the frame and the number of bits that should have been used to encode previous macroblocks of the frame, and (ii) a normalized activity level of the particular macroblock.

40. (Previously Presented) The method of claim 14, wherein the first frame type includes motion compensated macroblocks, and the first formula is based on a normalized sum of absolute differences that allocates more bits for the frame when a motion compensated residual for the macroblocks is more complex.

41. (Previously Presented) The method of claim 14, wherein the second frame type does not include motion compensated macroblocks, wherein the second formula is based on a normalized macroblock activity measure that allocates more bits for the frame if the macroblock activity is smaller.

42. (Previously Presented) The method of claim 14, wherein the quantizer value includes a quantizer adjustment computed by multiplying (i) the determined delta value, (ii) a scaling

function that is different for different macroblock coding methods, and (iii) a normalized activity level of the particular macroblock.

43.   (New) The method of claim 9, wherein the scaling function is a function of a number of macroblocks in the particular frame.